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Industrial policies and productive capacity policies for a digital economy

Note by the UNCTAD secretariat

Executive summary

Digitalization is introducing profound changes in the organization of the global economy, redefining value chains and blurring the boundaries between the production of goods and services. Digitalization can facilitate implementation of the 2030 Agenda for Sustainable Development, but only if proactive policies are adopted to build productive capacities that are relevant to the new digital economy. This includes mobilizing resources to close infrastructure gaps, building the digital skills and competences of firms and persons, enhancing innovation policies and utilizing demand-side industrial policies. The treatment of data, the basic productive input of the digital economy, poses policy and regulatory challenges with international dimensions that could be considered in the context of the consensus-building pillar of UNCTAD.

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I. Introduction

1. The world economy is undergoing the first stages of a digital revolution. Digitalization is expected to affect production, employment and trade patterns, and will require adapting existing policy frameworks in various areas, with the attendant implications for implementation of the 2030 Agenda for Sustainable Development. Digitalization is of direct relevance to several of the Sustainable Development Goals: Goal 5, on gender equality, Goal 8 on decent work and economic growth, Goal 9 on industry, innovation and infrastructure and Goal 17 on partnerships to achieve the Goals. Digitalization could also affect most of the other goals more indirectly, particularly Goal 1 on poverty, Goal 10 on inequality and Goal 12 on responsible consumption and production.

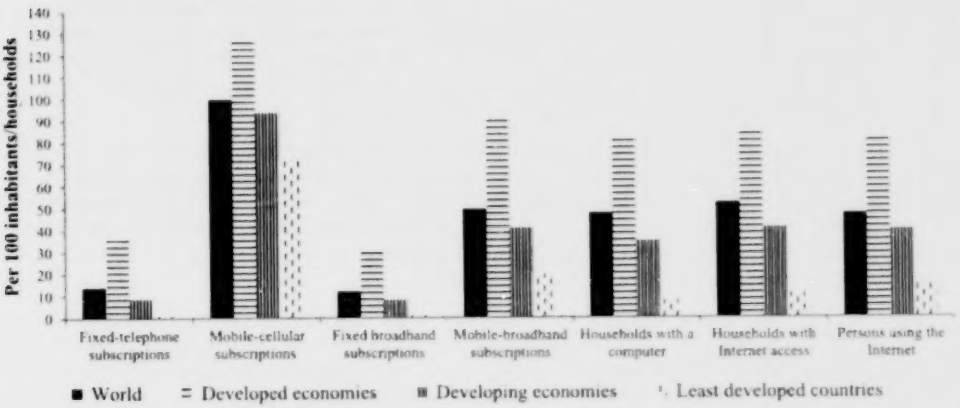
II. An evolving digital economy among significant digital divides

2. Key technologies underpinning the evolving digital economy include advanced robotics, artificial intelligence, the Internet of things, cloud computing, big data analytics and three-dimensional printing. While development of reliable indicators for the digital economy remains a work in progress, existing measures indicate that the digital economy is expanding in several dimensions. Global production of information and communications technology (ICT) goods and services now amounts to an estimated 6.5 per cent of global output, and some 100 million people are employed in the ICT services sector alone. Exports of ICT services grew by 40 per cent between 2010 and 2015. Worldwide electronic commerce (e-commerce) sales in 2015 reached $25.3 trillion, 90 per cent of which were in the form of business-to-business e-commerce and 10 per cent, in the form of business-to-consumer sales. UNCTAD estimates that cross-border business-to-consumer e-commerce was worth about $189 billion in 2015, which corresponds to 7 per cent of total business-to-consumer
e-commerce. Sales of robots are at the highest level ever; worldwide shipments of three-dimensional printers more than doubled in 2016, to over 450,000 devices, and are expected to reach 6.7 million devices in 2020. By 2019, the volume of global Internet traffic is expected to increase 66 times from what it was in 2005.[1]

3. The pace of integration into the digital economy varies considerably, however, both across and between countries (see figure). Although the number of Internet users grew by 60 per cent between 2010 and 2015, more than half of the world's population remains offline. Broadband connectivity in developing countries, when available, tends to be relatively slow and expensive. The 16 per cent of the world's adult population that use the Internet to pay bills or purchase items live mostly in developed countries; online activity in the least developed countries remains marginal. Small firms generally use the Internet for online sales much less than large firms do. Moreover, only 4 per cent of all three-dimensional printers are used in Africa and Latin America, and the use of robots is also very limited in most developing countries, except for some countries in Asia.

[1] See also UNCTAD, 2017, *Information Economy Report 2017: Digitalization, Trade and Development* (United Nations publication, Sales No. E.17.II.D.8, New York and Geneva).

Digital divides: Information and communications technology penetration, by level of development, 2016



Source: International Telecommunication Union (2016). *Measuring the Information Society Report 2016*. Geneva.

III. Opportunities and challenges from the digital economy

4. Although the speed of digital transformations differs, these transformations present both opportunities and risks for countries at all levels of development. ICTs, e-commerce and other digital applications help smaller businesses and entrepreneurs in developing countries to connect with global markets more easily. They can also promote the empowerment of women as entrepreneurs and traders. Furthermore, mobile and digital solutions are facilitating financial inclusion. Small firms in developing countries with sufficient connectivity may also be able to access various cloud services and obtain crowd financing through online platforms.

5. Digital technologies have a bearing on the prospects of firms from developing countries, including microenterprises and small and medium-sized enterprises, for participating in global trade. They allow firms to cut costs, streamline supply chains and more easily market products and services worldwide. Increased trade at reduced costs can have positive spillover effects on the economy as a whole, for example through enhanced competition, productivity and innovation, as well as improved access to talent and skills. Nevertheless, to derive such benefits from digitalization, firms will need to overcome various barriers. Many small firms in developing countries remain limited in terms of their digital involvement in relevant value chains, reflecting inadequate connectivity, limited awareness of the benefits of digitalization, skills gaps and other barriers. Digitalization could facilitate the integration of smaller firms into value chains to the extent that digital systems increase the modularity of value chains. Smaller firms could also benefit from participating in global platforms if they were to succeed in customizing their products to serve well-defined niche markets.

6. Positive impact, however, depends on the readiness of economies to take advantage of digitalization and on policies that address the serious development challenges associated with digitalization. Many developing countries, especially the least developed countries, are inadequately prepared to capture the many opportunities arising from digitalization. Moreover, digitalization may cause increased polarization and widening of income inequalities, as productivity gains may accrue mainly to a few, already relatively wealthy and skilled individuals. Winner-takes-all dynamics are typical in platform-based economies, where network effects benefit first movers and standard setters. Indeed, the world's top four companies by market capitalization are all closely linked to the digital economy: Apple, Alphabet (Google), Microsoft and Amazon. There are also concerns over how the flow of data, a key resource in the digital economy, can be harnessed for development while addressing concerns related to privacy and security.

IV. Adapting to new skills needs

7. Digitalization has caused concerns that trade and technology are replacing routine, codifiable tasks, thereby harming employment and income opportunities for lower-skilled workers. Although the trade-offs between jobs, on the one hand, and economy-wide productivity and growth, on the other, remain hotly debated, forecasts of robot-based job displacement in developing countries appear to be exaggerated.[2]

8. Digitalization is expected to lead to new types of jobs and employment, change the nature and conditions of work, alter skills requirements and affect the functioning of labour markets, as well as the international division of labour. As countries and locations benefit from improved access to similar digital infrastructure, harnessing these resources for development is crucial for implementation of the 2030 Agenda for Sustainable Development.

9. Given the relative newness and evolving nature of digitalization, its overall effects remain uncertain. Yet, any of its effects will be context specific, differing greatly among countries and sectors. While this raises a range of policy issues, it becomes increasingly important for countries to ensure an adequate supply of skilled workers with the strong cognitive, adaptive and creative skills necessary for "working with the machines".

10. At its most basic level, the need for digital skills concerns familiarity with the operation of digital devices and software (Internet browsers, spreadsheets, text processing) and how to obtain reliable information online to accomplish everyday business processes. Higher levels of digital skills will be increasingly necessary in many non-ICT occupations. These include proficiency in programming languages, data analysis and processing and modelling skills. For ICT occupations, digitalization will imply the need to understand basic algorithms and to use online resources to create new functions or develop more suitable applications when needed. Training in statistics, programming languages and big data analytics become important. At a higher level, skills to adapt technology and eventually to innovate includes sophisticated programming skills and knowledge of complex algorithms, such as machine learning. Skills in industrial robotics, automation and the Internet of things will become essential for the development of the manufacturing sector.

11. The differential impact of digitalization for the employment of men and women remains unclear. However, there is growing evidence that women-led businesses have become an important source of job creation and economic growth, hence contributing to the achievement of inclusive development. In this context, improving the access of women to training in digital skills and related entrepreneurial skills becomes a key factor in promoting inclusiveness in the digital economy.

V. Building productive capacity for maximizing development gains from the digital economy

12. Proactive policies to build the necessary capacities are critical for realization of the full potential of the digital economy. Building these capacities may be particularly challenging in vulnerable countries, such as the least developed countries, small island developing States and landlocked developing countries, that already face significant digital divides. Developing productive capacities requires promoting investment, building capabilities and fostering innovations. Governments can help by improving infrastructure, creating an enabling environment for investment, providing support to private initiatives and striving for coherence and participation.

[2] See also UNCTAD, 2017, Industrial robots and inclusive growth, Policy Brief No. 60, November.

13. The policy challenge of developing productive capacity for the digital economy varies in terms of countries' readiness to engage in and benefit from the digital economy, with the least developed countries generally being the least prepared. The challenge is also multifaceted. There is a wide spectrum of policy areas that need to be addressed holistically, such as ICT infrastructure, education and skills development, the labour market, intellectual property rights, competition, science, technology and innovation and fiscal issues, as well as trade and industrial policies. Policy coherence and a whole-of-government approach that ensures cross-sectoral collaboration within Governments, and effective coordination with other stakeholders, is essential.

14. Policy measures are needed, both at the national and international levels, to address the problem of ICT connectivity. Measures to enhance connectivity include mobilization of resources for upgrading of ICT infrastructure as well as efforts to ensure that policy frameworks and regulations secure an open, transparent and fair telecommunications market to attract additional investment. Measures to make broadband use more affordable include infrastructure sharing, effective spectrum management and avoidance of high taxes and import duties on telecommunications/ICT equipment and services. Internet connectivity is also dependent on the availability of a reliable electricity supply.

15. In response to the digital skills challenge noted above, countries will need to adjust their education and training systems. This will require changes to the education and training systems, as well as individual attitudes, and it may involve crafting appropriate curricula today for skills and jobs that will be required in the future. Furthermore, education policies also need to consider the continuous training of teachers. Digital skills need to be incorporated at all levels in the education system, as part of vocational training and of lifelong updating and upscaling of skills for the workforce. Encouraging the participation of girls in the study and professions of science, technology, engineering and mathematics in both developed and developing countries can help to build intermediate- and advanced-level digital skills.

16. Irrespective of their situation today, all countries should start preparing for future transformations. Attention should be given to the social and political dimension of the digital economy. Proactive redistribution policies can help mitigate the risk of increased polarization and income inequality. Social protection systems that support workers when they are between jobs or not working regularly are currently available only to about one quarter of the world's population.

17. To prevent the evolving digital economy from leading to widening digital divides and greater income inequalities, and to ensure that more people and enterprises in developing countries have the capacity to participate effectively in it, the international community will need to expand its support on a massive scale. The current level of support is unsatisfactory. Indeed, the share of ICT in total aid for trade declined from 3 per cent in 2002–2005 to only 1.2 per cent in 2015. Proactive efforts are therefore warranted. One way to capitalize on existing knowledge and maximize synergies with partners is to tap into the UNCTAD eTrade for all initiative. UNCTAD has also launched an innovative project to help the least developed countries assess their readiness to engage in and benefit from e-commerce and other activities in the digital economy. This will also help them identify areas in which targeted support is needed the most.[3]

[3] Finalization of the UNCTAD eTrade readiness assessments of Bhutan, Cambodia, Liberia, the Lao People's Democratic Republic, Myanmar, Nepal and Samoa is expected by the time of the sixty-fifth session of the Trade and Development Board.

VI. Ensuring equitable sharing of the benefits of moving towards a digital economy

18. Moving towards a digital economy poses serious challenges that require ambitious policies to ensure that developing countries can in fact experience the potential development benefits of these technologies. Such policy challenges go beyond skills development and bridging the digital gap, which, nonetheless, represent fundamental conditions for integration into the digital economy.

19. The new digital technologies are often considered a game changer with regard to how production is undertaken and organized in value chains. This is because they give intangibles (i.e. research and development, design, blueprints, software, market research and branding, databases etc.) a more prominent role in income generation. Activities related to intangibles may be considered services. This means that, in a digital world, services increasingly permeate the goods sector and that the traditional boundaries between goods and services in the production process are increasingly becoming blurred. By the same token, the various segments of a production process are becoming more closely interwoven, and pressure to geographically co-locate the design, production and distribution segments of the production process may increase.

20. The critical question is which part of the production process digitalization will make the move to be close to the other parts. Robot-based automation may lead to reshoring of production activities to developed countries. However, the limited systematic evidence that is available in this area suggests there is little reshoring from developing to developed countries.[4] By contrast, policies designed to increase the use of computer-aided design and three-dimensional printing devices in developing countries, combined with leveraging information on domestic market dynamics through ITCs associated with the Internet of things (including cloud computing and big data analysis), may allow moving design activities towards developing country firms to produce goods and services whose functionalities and features are customized for their clients. The ability to flexibly respond to domestic customers may become particularly important for developing countries whose export opportunities have been severely dented by the declining dynamism of world trade, but whose domestic or regional markets are relatively large.

21. To harness the development benefits that these impacts of digitalization on the production process may provide, developing countries may need to rebalance their traditional innovation and industrial policies oriented to the supply side, shifting towards greater attention to demand considerations. For innovation policies, this might imply complementing the traditional focus on building capabilities that support and accelerate the diffusion and adoption of imported technology, as well as the technology's adaptation to local circumstances, towards greater emphasis on generating newly designed goods and services with entirely new functionalities and features that are customized for local consumers. These more proactive approaches emphasize the importance of interaction between all actors who contribute to innovation.

22. The effectiveness of such inclusive innovation approaches could be reinforced through more industrial policies oriented to the demand side. These would see Governments acting: as direct customers of domestically designed and produced innovative goods and services, such as through public procurement; as providers of links between customers, designers and producers, such as through awareness campaigns and labelling; and as active promoters of private demand of innovations generated by domestic firms, such as through fiscal incentives. Combining such proactive and more demand-side-oriented innovation and industrial policies could make significant contributions to attaining the goals of the 2030 Agenda for Sustainable Development.

[4] See UNCTAD, 2017, *Trade and Development Report 2017: Beyond Austerity – Towards a Global New Deal* (United Nations publication. Sales No. E.17.II.D.5. New York and Geneva).

23. The digital economy relies on the generation, storage, processing and transfer of data, both within and across national boundaries. Access to data and data analysis are becoming strategically important to enhance the competitiveness of companies across sectors. Policymakers need to address data-related regulatory issues, balancing the need for companies to collect and analyse data for innovation and efficiency gains, on the one hand, and concerns about security, privacy and movement and ownership of data, on the other. Moreover, potential network effects from first-mover advantages in data ownership and associated potential anti-competitive practices should be addressed at the national level through appropriate fiscal, competition and antitrust policies. At the international level, the current system for data protection is fragmented, with varying global, regional and national regulatory approaches. In addition, many developing countries still lack legislation in this area altogether. This risks leading to the entry of developing countries into a digital world with standards largely set by more advanced countries and firms that act globally.

24. There remains a wide variation of views on these issues. Some hold that adopting negotiated rules at this stage may prevent regulations from arising through practices and patterns of behaviour that may be unduly shaped by firms that are already ahead in the digital economy. Others consider that adopting rules at this stage in this rapidly evolving area is premature and unduly reduces policy space for policymakers. Both positions note, however, that the existing institutional set-up of international trade and investment relationships may be ill-equipped to deal with issues arising with the new digital technologies. The UNCTAD intergovernmental machinery, in the context of the consensus-building pillar, may provide a suitable platform for dialogue on these issues to facilitate a convergence of approaches.

VII. Conclusions and policy recommendations

25. Digitalization represents a profound transformation of all aspects of economic life. It opens considerable opportunities for the implementation of the 2030 Agenda for Sustainable Development, but those opportunities will not materialize if proactive policies are not implemented at the national and international levels to address the significant challenges that digitalization raises, particularly for developing countries. This note has presented some of the policies that member States could consider in their discussions at the Trade and Development Board. These policies include the following:

(a) Digitalization, in the context of existing divides in access to the Internet and the overall readiness of developing countries to benefit from digital technologies, calls for a significant scaling up of the support to developing countries to improve ICT and related infrastructure, skills and enabling environment for the digital economy. In this regard, member States may wish to consider the role of various international cooperation initiatives, including mobilizing the UNCTAD eTrade for all platform for broader sharing by all countries in the benefits of digitalization.

(b) Countries should consider adapting their education and training systems and policies to cope with the challenges of the digital economy. A broad spectrum of digital skills needs to be incorporated at all levels of the education system. Emphasis is needed on removing existing biases that hamper digital skills development among women and girls.

(c) Governments should consider how social protection systems can be adapted to mitigate the risk of increased polarization and income inequality that digitalization may raise.

(d) Innovation policy in developing countries should evolve towards complementing capabilities to absorb and adapt existing technologies with those needed to generate innovative products and services that are customized for local consumers. The effectiveness of such approaches could be reinforced through more demand-side-oriented industrial policies.